Ciba Specialty Chemicals Corporation
USA
Toms River Site

Rec'd
11-12-02
F.B.

Ciba

November 8, 2002

Mr. Frank Battaglia
HBT
USEPA REGION 1
1 Congress Street
Suite 1100
Boston, MA 02114-2023

RE: Updated Sediment Sampling Plan for the Pawtuxet River, Former Ciba Facility, Cranston, RI

Dear Mr. Battaglia,

Enclosed is the updated Sediment Sampling Plan for the Pawtuxet River, per our meeting on October 10, 2002 and our e-mail/discussion on November 7, 2002.

If you have any comments or need clarification, please contact me at (732) 914-2594.

Yours truly,

Robert Youhas
Environmental Associate
Ciba Specialty Chemicals Corporation

Enclosure (1)

cc: M. Bradley, RIDEM
Ciba File

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RECD
11-12-02
F.B.

SEDIMENT SAMPLING PLAN FOR THE PAWTUXET RIVER

FORMER CIBA-GEIGY FACILITY CRANSTON, RHODE ISLAND

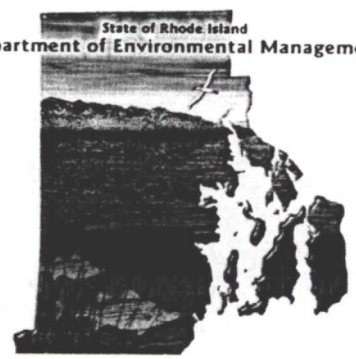
SUBMITTED BY

Ciba

SUBMITTED TO

EPA
United States Environmental Protection Agency

State of Rhode Island
Department of Environmental Management



PREPARED BY

Ciba Specialty Chemicals
Corporate Remediation
Toms River, New Jersey

OCTOBER 2002

Sediment Sampling and Analysis Plan for the Pawtuxet River
Cranston, Rhode Island

Ciba Specialty Chemicals Corp.

October 2002

1.0 OVERVIEW

This document presents a sediment sampling and analysis plan for the Pawtuxet River, Cranston, RI. USEPA and RIDEM require sediment sampling as part of a follow-up study on remediation work completed at the former Ciba facility in 1996 (CMS 1996). Sediment sampling and analysis of river sediments is proposed as a means of evaluating projected improvements in the four reaches of the Pawtuxet River adjacent to the former Ciba facility (see Figs. 2-1, 2-2, and 2-3).

1.1 Site History

The Alrose Chemical Company manufactured chemicals at the Site beginning in 1930. The Geigy Chemical Company purchased the Site in 1954 and merged with Ciba Corporation in 1970. The facility operated until May 1986. Throughout its operational history, the Site was used for the manufacturing of various agricultural products, leather and textile auxiliaries, plastics additives, optical brighteners, pharmaceuticals, and bacteriostats.

An Administrative Order of Consent in which Ciba agreed to conduct an RCRA Corrective Action Study at the Site was issued to Ciba. The Order became effective in June 1989. There are four stages to an RCRA Corrective Action Study: an RCRA Facility Asssessment (RFA), an RCRA Facility Investigation (RFI), a Corrective Measures Study (CMS) Proposal and a Corrective Measures Study Report. The RFA, conducted by USEPA prior to the Order, determined that known and/or suspected releases of hazardous materials had occurred at the Site. The RFI was then conducted in 1996 to characterize the impact of known or suspected releases that were determined by the RFA to require further investigation. The Pawtuxet River RFI consisted of five tasks: the physical characterization, source characterization, release characterization, river modeling (hydrodynamic, sediment transport, and fate and transport of contaminants), and an ecological risk assessment. The CMS Report for the Pawtuxet River was submitted in 1996. The CMS Report identified, described, and evaluated the corrective measures necessary to achieve the Media Protection Standards (MPS) proposed for the media of concern.

As part of the overall IRM program that Ciba is implementing at this Site, a voluntary sediment IRM (Interim Remedial Measure) was conducted during the period October 12, 1995 through January 10, 1996. The sediment IRM was conducted according to the procedures presented in the Conceptual Design Work Plan, Cranston Site, Cofferdam Interim Remedial Measure (Work Plan) that was submitted to USEPA, RIDEM, and the USACOE in May 1995. Over 2,225 tons of contaminated sediment were excavated from the Pawtuxet River and replaced with clean sand during the Sediment IRM. The excavated area contained a sampling location (SD-03R) where high concentrations of PCBs were measured, as well as the only location in the Upper or Lower Facility reaches where 4-Chloroaniline was measured. When completed, the Sediment IRM achieved its

primary objective of excavating and disposing of visually contaminated river sediment from the Former Cofferdam Area.

Post-excavation sampling of sediment is required by EPA/RIDEM. This sampling plan will fulfill that requirement.

1.2 Pawtuxet River Characteristics

The Pawtuxet River is a fourth order stream that drains about 230 square miles of mixed industrial and urban land. Flow in the river is regulated by reservoirs upstream. The river is classified by RIDEM (2000) as Class B1. Class B1 waters are designated for fish and wildlife habitat and primary and secondary contact recreational activities. The average daily flow in the river is about 350 cubic feet per second. Highest flows occur in April; lowest flows occur in August. In the 4.5 mile section of the river from the Cranston gauge to Pawtuxet Cove Dam, the river varies from about 60 to 200 feet wide, with mid-channel depths of 3 to 14 feet. Sediment thickness ranges from 0 to 4 feet thick, based on manual probing of sediment. Depositional zones, or areas where sediments are thicker, tend to occur on the inside bends of the river and just downstream of large pools. Sediment within these depositional zones is typically characterized by high total organic carbon, higher percentage of fine-grained material, and higher cation exchange capacity.

2.0 SEDIMENT SAMPLING OBJECTIVES

- Obtain sediment samples at the specified depths and locations proposed in Section 2.1.

- Analyze sediment samples for the *Proposed Sampling Analytes* in Table 2-4.

    - Inorganics, VOCs, and PAHs, and PCBs are the target analytes selected for study in this sampling plan - based on concentrations measured before the sediment IRM was implemented.

- Evaluate the current status of sediment contaminant concentrations upstream, downstream, and within the former Ciba facility reaches of the Pawtuxet River and compare these findings with the 1996 RFI Report data.

- Make recommendations.

2.1 Sediment Sampling Locations

Sediment samples will be taken within each of the four reaches of the former Ciba-Geigy facility: upstream, upper facility, lower facility, and downstream. The proposed sediment sampling locations are shown in Figures 2-1, 2-2, and 2-3. Sediment sampling locations have been selected on the basis of concentrations measured during the Release Characterization and from recommendations made in the 1996 CMS (Table 2-1). The

sampling locations will essentially be the same locations that were recommended in the CMS, but with some modifications:

- Ciba proposes to sample at three locations in the upstream reach: SD-TU7A, SD-00M, and SD-01R, instead of the five recommended in the CMS. Data exists on contaminant concentrations in the upstream reach of the Pawtuxet River from baseline sampling completed during the RFI. In addition, the five sampling locations recommended in the CMS are relatively uniform in terms of contaminant type and contaminant concentration (RFI Report, 1996). Ciba contends that the placement of the three proposed upstream sampling locations will provide a sufficient amount of data for comparison to RFI values.

- As a point of clarification, sampling location SD-03R is within the remediated Former Cofferdam Area. A sampling location identified only as "In the IRM fill" was proposed in the CMS. Station SD-03R is within this IRM fill, and will be used as a sampling location in this program.

- Ciba proposes to eliminate sampling location SD-09AL from the CMS list of recommended sampling locations. SD-09AL is within 120 feet of another sampling location, SD-10M, in the downstream reach of the Pawtuxet River. As both sampling locations are very close to one another, they possess very similar contaminant data (RFI Report, 1996). Ciba believes that data gathered from SD-10M will be representative of SD-09AL.

2.2 Sediment Sampling Methods

All samples will be collected using the gravity push core method used during the RFI. The coring device consists of two basic parts – a core barrel with a cutting head, and a core liner with core catcher. Starting at the downstream locations first (to avoid cross-contamination of disturbed sediments migrating downstream from the sampling points), the corer will be dropped to the sediment-water interface and then pushed by hand to 14" (to allow for an accurate 12" core) or the maximum possible penetration. Once the desired penetration depth is achieved, the corer will be retrieved into the boat and the core liner/catcher with intact core will be removed. Cores will then be transferred to glass containers with appropriate labeling for delivery to the laboratory. Table 2-2 presents the minimum sample sizes and acceptable containers for physical/chemical analyses of sediments.

Sediment from all sixteen sampling locations will be sampled according to the following protocol:

<u>Upstream</u>

SD-TU7A: 0-6"
SD-00M: 0-2", 2-4", 4-6", 6-12"
SD-01R: 0-6"

Facility Reach

SD-02L: 0-6"
SD-02R: 0-2", 2-4", 4-6", 6-12"
SD-03L: 0-6"
SD-03R: 0-6"
SD-04R: 0-6"
SD-05L: 0-2", 2-4", 4-6", 6-12"
SD-06R: 0-6"
SD-07L: 0-6"
SD-08M: 0-2", 2-4", 4-6", 6-12"

Downstream

SD-10M: 0-6"
SD-13R: 0-2", 2-4", 4-6", 6-12"
SD-16M: 0-2", 2-4", 4-6", 6-12"
SD-20M: 0-6"

These chosen sampling depths provide a sufficient sediment profile that takes into account sediment deposition/resuspension over time. Sectioning of the cores will be done in the field. Three replicates will be taken per station, but only one core per station will be analyzed immediately. The other two replicates will be preserved (frozen) for additional analysis as needed.

2.2.1 Field Documentation

To ensure proper record keeping, the following list of standardized forms will be used in this investigation:

- *Field log*—General information such as the names of the field crew, arrival and departure dates and times, weather, and other miscellaneous observations will be recorded in a field log.

- *Station/sample log*—Each gear deployment event should be recorded on a station log sheet. One or more station/sample log sheets may be completed for each station where sediment sampling is conducted. The station name, date, gear and cast number, depth, and location coordinates will be recorded on each log sheet. Penetration depth, sediment type, sediment color, sediment odor, presence of any organisms, and obvious evidence of contamination (e.g., sheen, wood waste, oil droplets, sandblast grit, paint chips) will also be recorded, as well as the sample type, sample identifier, and unique sample number. If any materials such as woody debris, shells, or rocks are removed prior to homogenizing the sample, the

type of material and approximate quantity will be noted. Any deviations from the sampling and analysis plan that were necessitated by field conditions will also be noted on the station/sample log sheet.

- *Sample analysis request form*—Each set of samples sent to a laboratory will be accompanied by a sample analysis request form that identifies the samples by their unique identifying number. This form should identify any preservative or other sample pretreatment applied and the analyses to be conducted by referencing a list of specific analytes or the statement of work for the laboratory. One copy of this form will be retained by the chief scientist, and one copy will accompany the shipment of samples to the laboratory.

- *Chain-of-custody form*— Provisions will be included in all sediment sampling and analysis plans for documenting the chain-of-custody between sample collection and arrival at the analytical laboratory. Each sample container will be recorded on a chain-of-custody form at the end of each day's sampling. The chain-of-custody form will be completed in duplicate or triplicate and will identify the sample collection date and time, the project, and the chief scientist. It is the chief scientist's responsibility to ensure that these forms are accurately completed and signed at the time of sample transfer. One copy of the form will be placed in a waterproof bag and attached to the inside of each sample cooler. The chief scientist will keep one copy of the form. In the event that sediment subsamples are being sent to different laboratories (e.g., chemistry laboratory, toxicology laboratory), separate chain-of-custody forms will be prepared for each laboratory and each sample cooler. The sample cooler will be sealed with chain-of-custody tape and kept in a secure location when not in the presence of the chief scientist or assigned crew.

2.2.2 Sample Storage Requirements for Chemical/Physical Analyses

All sediment samples intended for chemical/physical analyses will be transported to the analytical laboratory on ice at 4°C. Upon receipt at the laboratory, storage temperatures and maximum holding times will be determined based on the analyses to be performed. In some cases, the requirements may vary, depending on how long it will be before the laboratory expects to analyze the samples. Required storage temperatures and maximum holding times are presented in Table 2-3. Sediment samples may be archived for later analysis by freezing them and holding them at -18°C; allowance for expansion of the sample should be made to prevent breakage of the sample bottles upon freezing. The archived samples may be thawed within the maximum holding times listed in Table 2-3 and analyzed for any of the analytes, except for ammonia, total sulfides, volatile organic compounds, and grain size.

2.3 Sediment Sampling Analyses

This sampling campaign will provide information on how concentrations of target contaminants have changed since the last sampling round was completed in the early

1990s. The chemicals proposed for monitoring include compounds for which MPS are being developed and those identified in the Aquatic Baseline Ecological Risk Assessement (Ciba, 1996) and Corrective Measures Study (Ciba, 1996). The proposed list of chemicals recommended for monitoring is summarized by chemical class in Table 2-4 The 1996 RCRA RFI sediment data for each proposed sampling location is presented in Tables 2-5, 2-6, 2-7, and 2-8. These RFI values will later be compared with the findings of this sampling campaign. Lancaster Laboratories will be the designated certified laboratory that will do all of the sediment analyses, except for Tinuvin 328. Tinuvin 328 will be analyzed in the laboratory at the Ciba-Geigy Toms River Superfund Site located in Toms River, New Jersey.

3.0 HEALTH AND SAFETY

The site-specific Health and Safety Plan for this sediment sampling plan can be found in Appendix B. In addition, boating safety guidelines can be found in Appendix D.

4.0 REFERENCES

Ciba-Geigy Corporation. 1996. RCRA Facility Investigation Report for the Pawtuxet River, Volume 1. March.

Ciba-Geigy Corporation. 1996. RCRA Facility Investigaiton Report, Volume 3, Aquatic Baseline Ecological Risk Assessment for the Ciba-Geigy Site at Cranston, Rhode Island. March.

State of Rhode Island and Providence Plantations Department of Environmental Management and Water Resources. 2000. Water Quality Regulations. June.

Washington Department of Ecology: Sediment Management. 2001. http://www.ecy.wa.gov/programs/tcp/smu/sapa/sapa.htm.

Woodward-Clyde Consultants. 1996. Pawtuxet River Corrective Measures Study. August.

APPENDIX A

FIGURES & TABLES

Table 2-1 Proposed Sampling Locations*

Upstream	Upper Facility	Lower Facility	Downstream
SD-01R	SD-02L	SD-04R	SD-10M
SD-TU7A	SD-02R	SD-05L	SD-13R
SD-00M	SD-03L	SD-06R	SD-16M
	SD-03R	SD-07L	SD-20M
		SD-08M	

*Woodward-Clyde Consultants. 1996. Pawtuxet River Corrective Measures Study.

Table 2-2. Minimum Sediment Sample Sizes and Acceptable Containers for Physical/Chemical Analyses*

Sample Type	Minimum Sample Size[a]	Container Type[b]
Physical/Chemical Analyses		
Grain size	100–150 g	P,G
Total solids	50 g	P,G
Total volatile solids	50 g	P,G[c]
Total organic carbon	25 g	P,G
Ammonia	25 g	P,G
Total sulfides	50 g	P,G[c]
Oil and grease	100 g	G
Metals (except mercury)	50 g	P,G
Mercury	1 g	P,G
Volatile organic compounds	50 g	G,T[c]
Semivolatile organic compounds	50–100 g	G
Pesticides and PCBs	50–100 g	G,T

[a] Recommended field sample sizes (wet weight basis) for one laboratory analysis. If additional laboratory analyses are required (e.g., laboratory replicates, allowance for having to repeat an analysis), the field sample size should be increased accordingly. For some chemical analyses, smaller sample sizes may be used if comparable sensitivity can be obtained by adjusting instrumentation, extract volume, or other factors of the analysis.

[b] P - linear polyethylene; G - borosilicate glass; T - polytetrafluorethylene (PTFE, Teflon®)-lined cap.

[c] No headspace or air pockets should remain. If such samples are frozen in glass containers, breakage of the container is likely to occur.

*Washington Department of Ecology: Sediment Management. 2001. http://www.ecy.wa.gov/programs/tcp/smu/sapa/sapa.htm

Table 2-3. Storage Temperatures and Maximum Holding Times for Physical/Chemical Analyses*

Sample Type	Storage Temperature	Maximum Holding Time
Grain Size	Cool, 4°C	6 months
Total solids	Cool, 4°C Freeze, -18°C	14 days 6 months
Total volatile solids	Cool, 4°C Freeze, -18°C	14 days 6 months
Total organic carbon	Cool, 4°C Freeze, -18°C	14 days 6 months
Ammonia	Cool, 4°C	7 days
Total sulfides	Cool, 4°C (1 N zinc acetate)	7 days
Oil and grease	Cool, 4°C (HCl) Freeze, -18°C (HCl)	28 days 6 months
Metals (except mercury)	Cool, 4°C Freeze, -18°C	6 months 2 years
Mercury	Freeze, -18°C	28 days
Semivolatile organic compounds; pesticides and PCBs; PCDDs/PCDFs	Cool, 4°C Freeze, -18°C	10 days 1 year
after extraction	Cool, 4°C	40 days
Volatile organic compounds	Cool, 4°C Freeze, -18°C	14 days 14 days

Note: HCl - hydrochloric acid
PCB - polychlorinated biphenyl
PCDD - polychlorinated dibenzo-p-dioxin
PCDF - polychlorinated dibenzofuran

http://www.ecy.wa.gov/programs/tcp/smu/sapa/sapa.htm

Table 2-4 Proposed Sampling Analytes*

INORGANICS	*VOCs*
CADMIUM	CHLOROBENZENE
COPPER	M&P-XYLENE
CYANIDE	O-XYLENE
LEAD	TOLUENE
THALLIUM	
ZINC	*OTHER SEMI-VOC*
	1,2-DICHLOROBENZENE
PAHs	4-CHLOROANILINE
2-METHYLNAPHTHALENE	TINUVIN 328
ANTHRACENE	
BENZO(A)ANTHRACENE	*OTHER*
BENZO(A)PYRENE	GRAIN SIZE
BENZO(B)FLUORANTHENE	TOTAL ORGANIC CARBON
BENZO(G,H,I)PERYLENE	
BENZO(K)FLUORANTHENE	*PCBs*
CHRYSENE	PCB-1221
DIBENZ(A,H)ANTHRACENE	PCB-1232
FLUORANTHENE	PCB-1242
INDENO(1,2,3-CD)PYRENE	PCB-1248
PYRENE	PCB-1254
	PCB-1260

*Woodward-Clyde Consultants. 1996. Pawtuxet River Corrective Measures Study.

Table 2-5 1996 RCRA Facility Investigation Sediment Data for the Pawtuxet River*

UPSTREAM LOCATIONS

CONSTITUENTS	SD-01R	SD-TU7A	SD-00M
Volatile Organics			
CHLOROBENZENE	0.065 U	0.00385 U	0.06 U
M&P-XYLENE	0.065 U	0.00385 U	0.06 U
O-XYLENE	0.065 U	0.00385 U	0.06 U
TOLUENE	0.065 U	0.00385 U	0.06 U
Semi-Volatile Organics			
1,2-DICHLOROBENZENE	0.6 U	0.255 U	0.6 U
4-CHLOROANILINE	0.6 U	0.33 J	0.6 U
TINUVIN 328	NA	NA	NA
Inorganics			
CADMIUM	0.235 U	1.2	0.25 U
COPPER	27.3 J	50.5 J	9.0 J
CYANIDE	0.175 U	R	0.29 U
LEAD	11 J	50.5	19.7
THALLIUM	0.325	0.75 U	0.235 U
ZINC	28 J	63.1	35.2 J
PAHs			
2-METHYLNAPHTHALENE	0.6 U	0.255 U	0.6 U
ANTHRACENE	0.14 J	0.05 J	0.11 J
BENZO(A)ANTHRACENE	0.51 J	0.2 J	0.28 J
BENZO(A)PYRENE	0.43 J	0.22 J	0.6 U
BENZO(B)FLUORANTHENE	0.74 J	0.36	0.41 J
BENZO(G,H,I)PERYLENE	0.39 J	0.15 J	0.6 U
BENZO(K)FLUORANTHENE	0.83 J	0.14 J	0.42 J
CHRYSENE	0.61 J	0.27 J	0.34 J
DIBENZ(A,H)ANTHRACENE	0.19 J	0.155 U	0.6 U
FLUORANTHENE	1.7	0.58	0.64 J
INDENO(1,2,3-CD)PYRENE	0.32 J	0.15 J	0.6 U
PYRENE	0.61 J	0.56	0.76 J
PCBs			
PCB-1221	0.0125 U	0.05 U	0.0115 U
PCB-1232	0.0125 U	0.0255 U	0.0115 U
PCB-1242	0.0065 U	0.0255 U	0.0055 U
PCB-1248	0.0065 U	0.0255 U	0.0055 U
PCB-1254	0.0125 U	0.0255 U	0.0115 U
PCB-1260	0.0125 U	0.0255 U	0.0115 U

All results are in mg/kg (ppm) J = estimated R = rejected NA = not analyzed
U = non-detected (non-detected results are listed at one half the reported detection limit)

Depth range for all samples was 0-6"

*Data from Ciba-Geigy Corporation. 1996. RCRA Facility Investigation Report for the Pawtuxet River, Volume 1. March.

Table 2-6 1996 RCRA Facility Investigation Sediment Data for the Pawtuxet River*

UPPER FACILITY LOCATIONS

CONSTITUENTS	SD-02L	SD-02R	SD-03L	SD-03R
Volatile Organics				
CHLOROBENZENE	0.063 J	26	0.078 J	360 J
M&P-XYLENE	0.155 U	1 J	0.15 U	8.2 J
O-XYLENE	0.155 U	0.23 J	0.15 U	7 U
TOLUENE	0.076 J	0.87 J	0.1 J	470 J
Semi-Volatile Organics				
1,2-DICHLOROBENZENE	0.22 J	4.6	1.45 U	R
4-CHLOROANILINE	1.3 U	1.5 U	1.45 U	32 J
TINUVIN 328	NA	NA	NA	NA
Inorganics				
CADMIUM	5.3 J	22 J	6.5 J	11 J
COPPER	516 J	947 J	98.6 J	306 J
CYANIDE	25.6	13.2	2.8	3
LEAD	375 J	594 J	100 J	223 J
THALLIUM	1.16	0.974	0.936	0.802
ZINC	1070 J	1460 J	221 J	13900 J
PAHs				
2-METHYLNAPHTHALENE	0.44 J	2.1 J	1.45 U	R
ANTHRACENE	0.53 J	0.93 J	0.29 J	R
BENZO(A)ANTHRACENE	3.6	3.2	1.6 J	R
BENZO(A)PYRENE	3.5	3.6	1.4 J	R
BENZO(B)FLUORANTHENE	6.9	6.5	2.8 J	R
BENZO(G,H,I)PERYLENE	3.2	3.3	1.7 J	R
BENZO(K)FLUORANTHENE	7.7	7.3	3.1	R
CHRYSENE	6.1	5.2	2.2 J	R
DIBENZ(A,H)ANTHRACENE	1.3 J	1.5 J	0.62 J	R
FLUORANTHENE	14	11	5.3	R
INDENO(1,2,3-CD)PYRENE	2.9	3	1.4 J	R
PYRENE	5.3	3.9	1.9 J	R
PCBs				
PCB-1221	2.65 U	3.05 U	0.03 U	27 U
PCB-1232	2.65 U	3.05 U	0.03 U	27 U
PCB-1242	1.35 U	1.55 U	0.015 U	13.5 U
PCB-1248	1.35 U	1.55 U	0.015 U	13.5 U
PCB-1254	2.65 U	3.05 U	0.03 U	210
PCB-1260	2.65 U	3.05 U	0.03 U	27 U

All results are in mg/kg (ppm) J = estimated R = rejected NA = not analyzed

Depth range for all samples was 0-6"

U = non-detected (non-detected results are listed at one half the reported detection limit)
*Data from Ciba-Geigy Corporation. 1996. RCRA Facility Investigation Report for the Pawtuxet River, Volume 1. March.

Table 2-7 1996 RCRA Facility Investigation Sediment Data for the Pawtuxet River*

LOWER FACILITY LOCATIONS

CONSTITUENTS	SD-04R	SD-05L	SD-06R	SD-07L	SD-08M
Volatile Organics					
CHLOROBENZENE	0.17	0.065 U	0.085 U	0.145 U	0.065 U
M&P-XYLENE	0.075 U	0.065 U	0.085 U	0.145 U	0.065 U
O-XYLENE	0.075 U	0.065 U	0.085 U	0.145 U	0.065 U
TOLUENE	0.58	0.035 J	R	0.145 U	0.065 U
Semi-Volatile Organics					
1,2-DICHLOROBENZENE	0.7 U	0.6 U	0.8 U	0.2 J	0.6 U
4-CHLOROANILINE	0.7 U	0.6 U	0.8 U	1.45 U	0.6 U
TINUVIN 328	NA	NA	NA	NA	NA
Inorganics					
CADMIUM	0.94 J	0.22 U	2	13.5 J	0.275 U
COPPER	81.5 J	15.2 J	21.3 J	226 J	6.4 U
CYANIDE	0.2 U	0.265 U	0.39 U	1.3	0.155 U
LEAD	79.3 J	24.7	28.4	200 J	16.5 J
THALLIUM	0.463	0.235 U	0.3 U	1.27	0.285 U
ZINC	225 J	47 J	63.1 J	370 J	43.7 J
PAHs					
2-METHYLNAPHTHALENE	0.7 U	0.6 U	0.8 U	1.45 U	0.6 U
ANTHRACENE	0.14 J	0.048 J	0.085 J	0.33 J	0.14 J
BENZO(A)ANTHRACENE	0.8 J	0.32 J	0.96 J	2.1 J	0.42 J
BENZO(A)PYRENE	0.85 J	0.6 U	0.79 J	2.2 J	0.35 J
BENZO(B)FLUORANTHENE	1.4	0.53 J	2.1	4.6	0.32 J
BENZO(G,H,I)PERYLENE	0.84 J	0.6 U	0.8 U	2.2 J	0.32 J
BENZO(K)FLUORANTHENE	1.6	0.55 J	2.2	5.1	0.36 J
CHRYSENE	1.1 J	0.37 J	1.1 J	3.4	0.44 J
DIBENZ(A,H)ANTHRACENE	0.14 J	0.6 U	0.8 U	0.34 J	0.6 U
FLUORANTHENE	3.1	0.6 J	1.6	8.2	1.2
INDENO(1,2,3-CD)PYRENE	0.7 J	0.6 U	1 J	2 J	0.28 J
PYRENE	1 J	0.67 J	1.7	2.6 J	0.43 J
PCBs					
PCB-1221	0.15 U	0.06 U	0.32 U	0.0285 U	0.0125 U
PCB-1232	0.15 U	0.06 U	0.32 U	0.0285 U	0.0125 U
PCB-1242	0.075 U	0.03 U	0.16 U	0.014 U	0.0065 U
PCB-1248	0.075 U	0.03 U	0.16 U	0.014 U	0.0065 U
PCB-1254	0.15 U	0.06 U	0.32 U	0.0285 U	0.0125 U
PCB-1260	0.15 U	0.06 U	0.32 U	0.0285 U	0.0125 U

All results are in mg/kg (ppm) J = estimated R = rejected NA = not analyzed
U = non-detected (non-detected results are listed at one half the reported detection limit)

Depth range for all samples was 0-6"

*Data from Ciba-Geigy Corporation. 1996. RCRA Facility Investigation Report for the Pawtuxet River, Volume 1. March.

Table 2-8 1996 RCRA Facility Investigation Sediment Data for the Pawtuxet River*

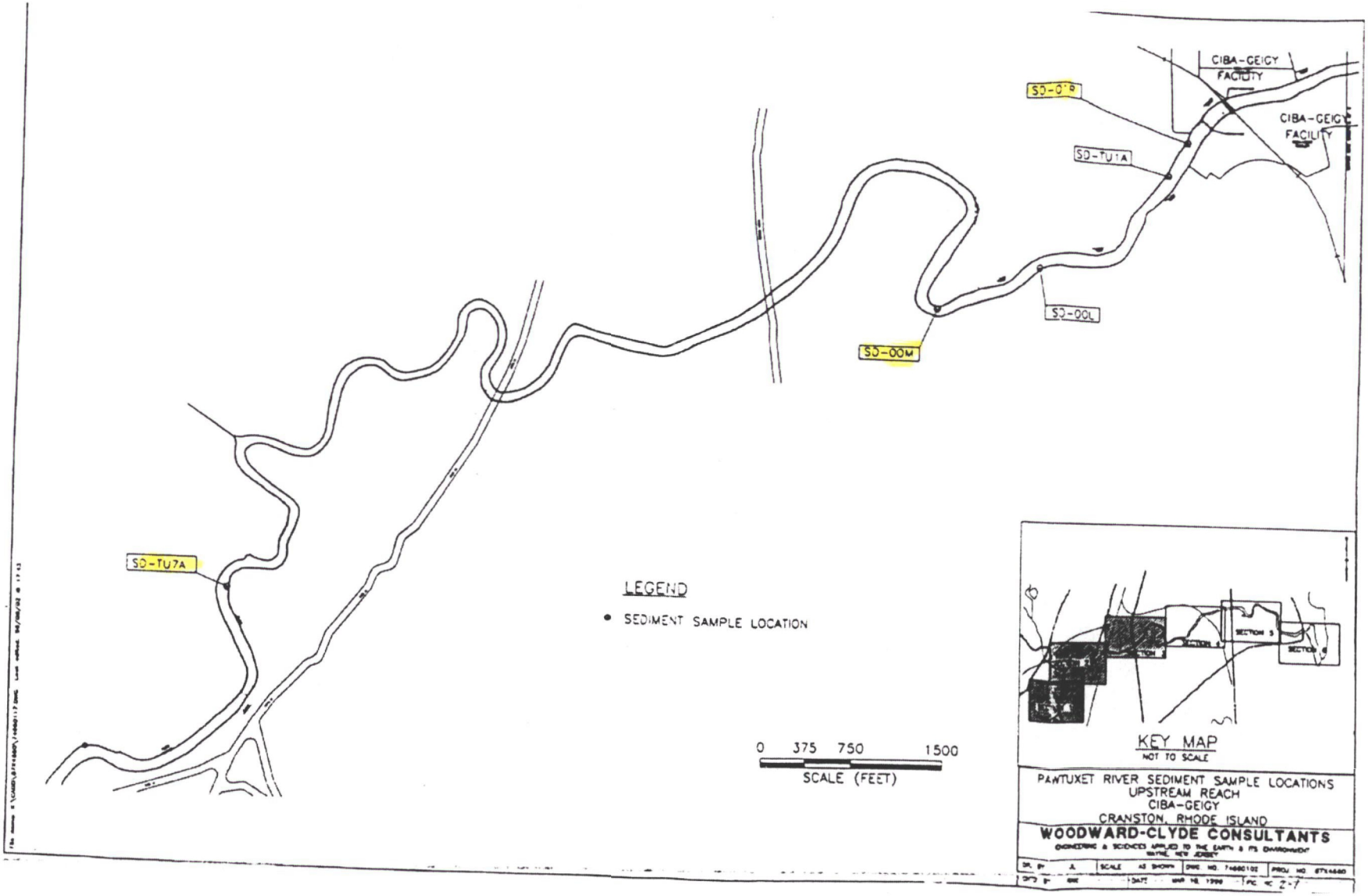
DOWNSTREAM LOCATIONS

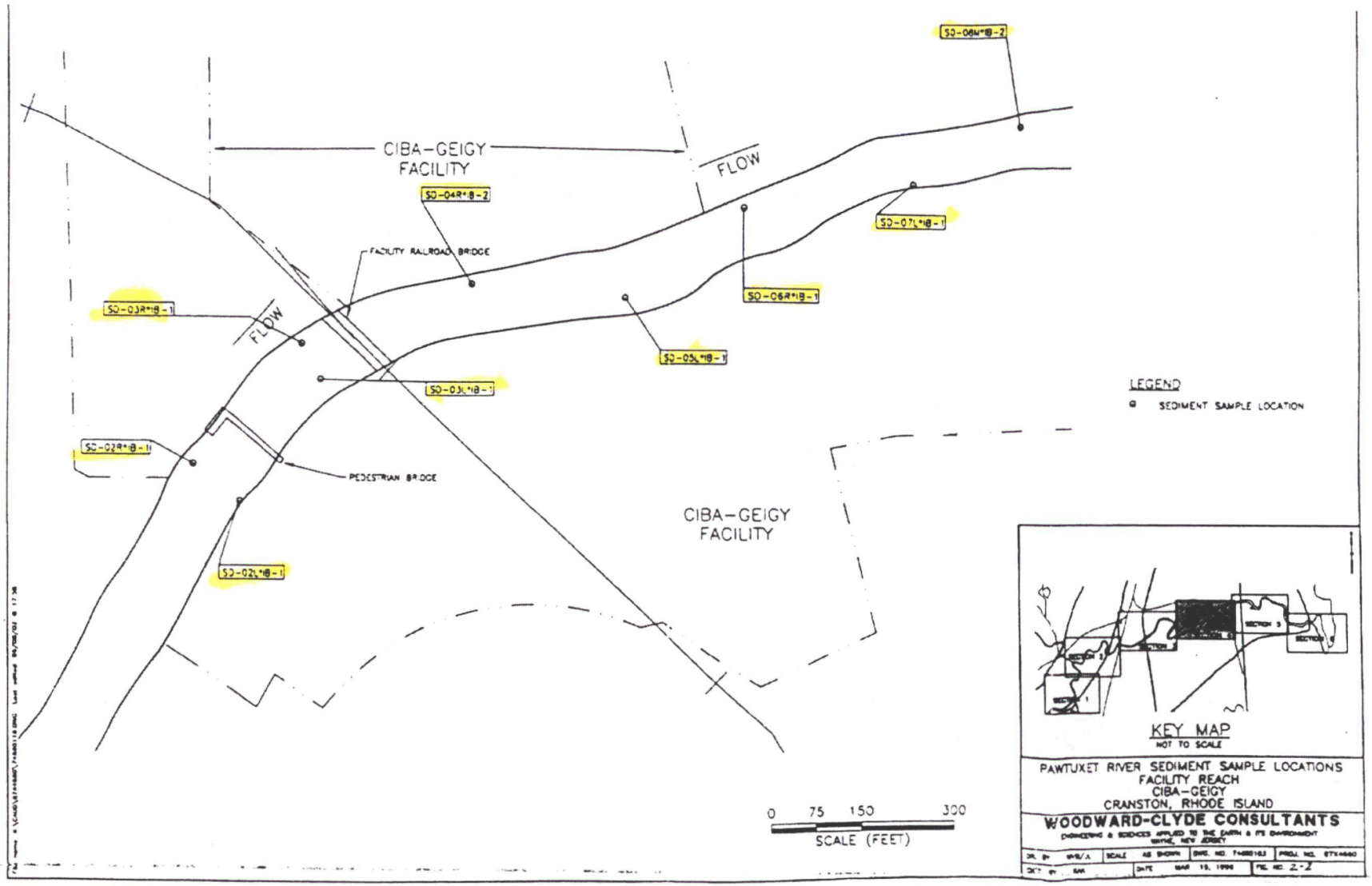
CONSTITUENTS	SD-10M	SD-13R	SD-16M	SD-20M
Volatile Organics				
CHLOROBENZENE	0.07 U	0.072 J	0.065 U	0.06 U
M&P-XYLENE	0.07 U	0.09 U	0.065 U	0.06 U
O-XYLENE	0.07 U	0.09 U	0.065 U	0.06 U
TOLUENE	0.07 U	0.14 J	0.065 U	0.06 U
Semi-Volatile Organics				
1,2-DICHLOROBENZENE	0.65 U	0.85 U	0.6 U	R
4-CHLOROANILINE	0.65 U	0.85 U	0.6 U	R
TINUVIN 328	NA	NA	NA	NA
Inorganics				
CADMIUM	1.6	6.5 J	0.255 U	0.25 U
COPPER	21.5 J	117 J	16.6 J	5.55 U
CYANIDE	0.305 U	0.195 U	0.155 U	0.135 U
LEAD	18.5	84.9 J	13.9 J	13.5 J
THALLIUM	0.27 U	0.578	0.442	0.21 U
ZINC	58.4 J	195 J	50.4 J	44.3 J
PAHs				
2-METHYLNAPHTHALENE	0.65 U	0.85 U	0.6 U	R
ANTHRACENE	0.16 J	0.2 J	0.054 J	R
BENZO(A)ANTHRACENE	0.67 J	1 J	0.35 J	R
BENZO(A)PYRENE	0.56 J	1 J	0.31 J	R
BENZO(B)FLUORANTHENE	1.1 J	1.8	0.46 J	R
BENZO(G,H,I)PERYLENE	0.65 U	0.95 J	0.25 J	R
BENZO(K)FLUORANTHENE	1.2 J	2.1	0.52 J	R
CHRYSENE	0.79 J	1.4 J	0.41 J	0.15 J
DIBENZ(A,H)ANTHRACENE	0.65 U	0.85 U	0.13 J	R
FLUORANTHENE	1.3	3.6	1 J	0.32 J
INDENO(1,2,3-CD)PYRENE	0.65 U	0.83 J	0.24 J	R
PYRENE	1.5	1.2 J	0.35 J	0.14 J
PCBs				
PCB-1221	0.265 U	0.0175 U	0.013 U	0.0115 U
PCB-1232	0.265 U	0.0175 U	0.013 U	0.0115 U
PCB-1242	0.135 U	0.009 U	0.0065 U	0.0055 U
PCB-1248	0.135 U	0.009 U	0.0065 U	0.0055 U
PCB-1254	0.265 U	0.0175 U	0.013 U	0.0115 U
PCB-1260	0.265 U	0.0175 U	0.013 U	0.0115 U

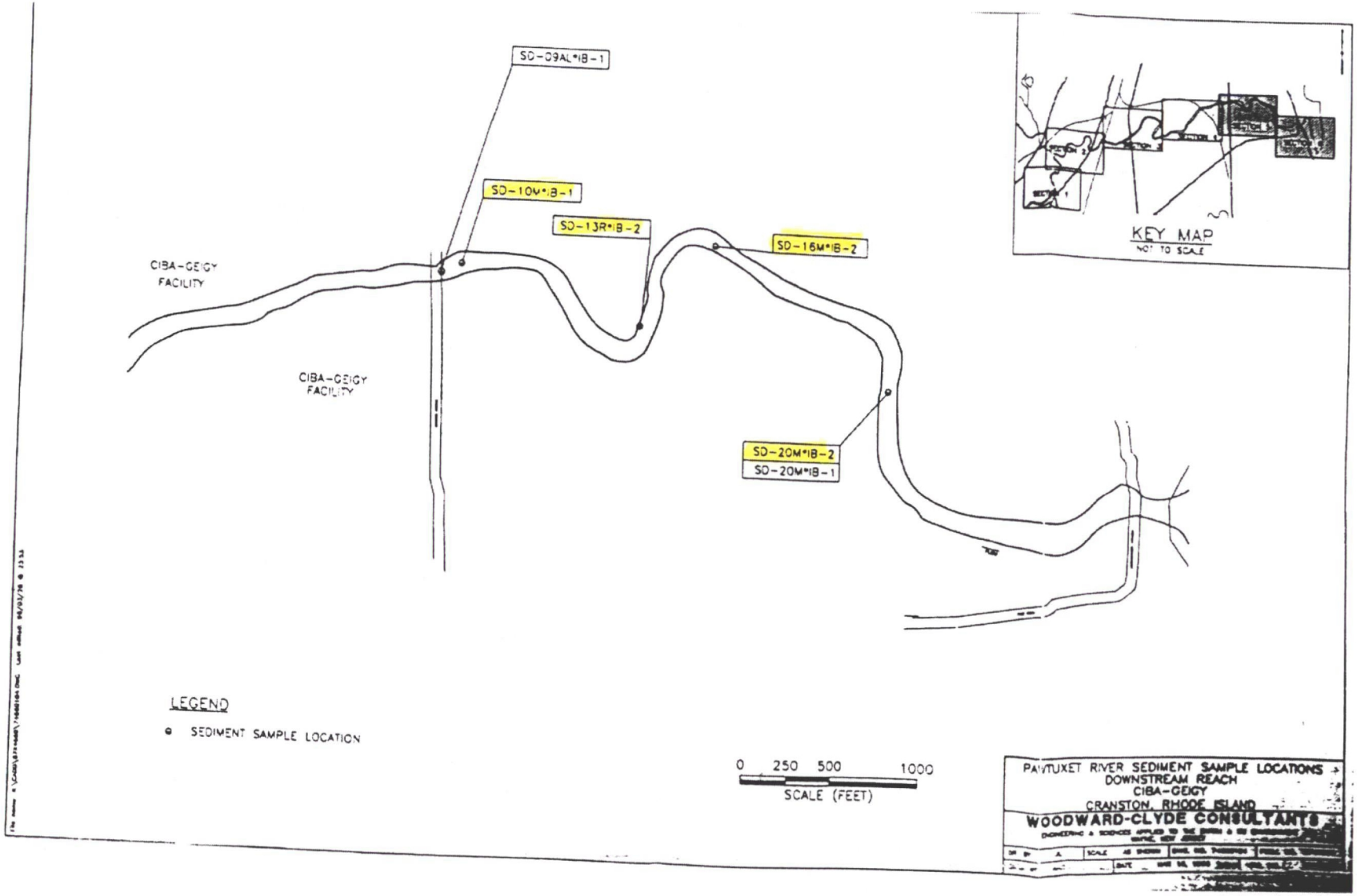
All results are in mg/kg (ppm) J = estimated R = rejected NA = not analyzed
U = non-detected (non-detected results are listed at one half the reported detection limit)

Depth range for all samples was 0-6"

*Data from Ciba-Geigy Corporation. 1996. RCRA Facility Investigation Report for the Pawtuxet River, Volume 1. March.


CIBA-GEIGY FACILITY
CIBA-GEIGY FACILITY
SD-0°8
SD-TU1A
SD-00L
SD-00M
SD-TU7A
LEGEND
SEDIMENT SAMPLE LOCATION
0 375 750 1500
SCALE (FEET)
KEY MAP
NOT TO SCALE
PAWTUXET RIVER SEDIMENT SAMPLE LOCATIONS
UPSTREAM REACH
CIBA-GEIGY
CRANSTON, RHODE ISLAND
WOODWARD-CLYDE CONSULTANTS


SD-06M*18-2
CIBA-GEIGY FACILITY
FLOW
SD-04R*18-2
SD-07L*18-1
FACILITY RAILROAD BRIDGE
SD-06R*18-1
SD-03R*18-1
FLOW
SD-05L*18-1
SD-03L*18-1
SD-02R*18-1
PEDESTRIAN BRIDGE
CIBA-GEIGY FACILITY
SD-02L*18-1
LEGEND
SEDIMENT SAMPLE LOCATION
0 75 150 300
SCALE (FEET)
KEY MAP
NOT TO SCALE
PAWTUXET RIVER SEDIMENT SAMPLE LOCATIONS
FACILITY REACH
CIBA-GEIGY
CRANSTON, RHODE ISLAND
WOODWARD-CLYDE CONSULTANTS
ENGINEERING & SCIENCES APPLIED TO THE EARTH & ITS ENVIRONMENT
WAYNE, NEW JERSEY
SCALE AS SHOWN
DATE MAR 19, 1996
FIG. NO. 2-2


SD-09AL*1B-1
SD-10M*1B-1
SD-13R*1B-2
SD-16M*1B-2
SD-20M*1B-2
SD-20M*1B-1
CIBA-GEIGY FACILITY
CIBA-GEIGY FACILITY
KEY MAP
NOT TO SCALE
LEGEND
SEDIMENT SAMPLE LOCATION
0 250 500 1000
SCALE (FEET)
PAWTUXET RIVER SEDIMENT SAMPLE LOCATIONS
DOWNSTREAM REACH
CIBA-GEIGY
CRANSTON, RHODE ISLAND
WOODWARD-CLYDE CONSULTANTS

APPENDIX B

HEALTH AND SAFETY PLAN

Cranston Pawtuxet River Sediment Sampling Health and Safety Plan

General Site Information

Site Name: Pawtuxet River
In Vicinity of Former Ciba Site
180 Mill Street
Cranston, Rhode Island

Emergency Information and Local Resources, Cranston, Rhode Island

Public and Private Resources	Telephone Numbers
Police Department	911 or 401-942-2211
Fire Department/Ambulance	911 or 401-461-5000
Hospital Emergency Room	401-444-4000
Poison Control	401-444-5727
National Response Center	1-800-424-8802

Nearest Hospital: Rhode Island Hosptial
593 Eddy Street
Providence, Rhode Island

Directions: From Site, turn left onto Mill Street to Park Avenue (Rt. 12) – Left onto Park Avenue and continue to I-95 North to Thurbers Avenue exit – Bear left at end of ramp onto Thurbers Avenue – Take Thurbers Avenue to Eddy Street to Hospital.

Identified Site Hazards, Pawtuxet River, Cranston, RI

Waste Type(s)		Waste Characteristics		Type/Form of Hazard	
Petroleum		**Toxic**	X	Dust	
Liquid		Corrosive		Liquid	
Sludge		Ignitable		Gas	
Sediment	X	**Volatile**	X	Vapors	
Unknown		Radioactive		**Contact**	X
Other		Reactive		Other	
		Unknown		IDLH	

Tasks

River sediment subsurface investigations will be performed to document sediment contaminant conditions. Ciba Specialty Chemicals will obtain river sediment cores for a period of up to five days. Core samples will be collected, sliced (cores will be sectioned in the field), and submitted for laboratory analysis. Level D PPE will be worn for all activities. All personnel are 40-hour OSHA certified (see Attachment B for current training certificates).

Chemcial Exposures

From previous sediment sampling campaigns, the constituents that have been found in sediments within the vicinity of the Site include those contained in Table 2-4 of the sediment sampling plan. Concentrations of these constituents from the last sampling campaign are found in Tables 2-5, 2-6, 2-7, and 2-9 of the sampling plan. In addition, chemical data sheets for the proposed sediment analytes are included in Appendix C.

In general, workers should also be aware of some indications of toxic effects of chemical exposure which are described below:

- Observable by others:
  - Changes in complexion, skin discoloration
  - Lack of coordination
  - Changes in demeanor
  - Excessive salivation, papillary response
  - Changes in speech pattern
- Non-observable by others:
  - Headaches

- Dizziness
- Blurred vision
- Cramps
- Irritation of eyes, skin, or respiratory tract

First Aid

General first aid procedures for exposure include, but are not limited to, the following procedures:

- If contaminant contacts the eyes, irrigate immediately with large amounts of water
- If contaminant contacts skin, wash with soap and water promptly
- If contaminant is inhaled, move the exposed person to fresh air at once. If the worker's breathing has stopped, perform artificial respiration **ONLY** if appropriately trained and currently certified by the Red Cross or equivalent. Request appropriate medical attention as soon as possible using telephone number(s) listed in Table 1 (Emergency Information and Local Resources).

On-site VHB personnel will keep a fully-stocked First-Aid Kit within a field vehicle during site activities.

On-site Control

No unauthorized personnel should enter the work zone without appropriate 40-hour OSHA site worker safety training.

On-Site Personnel	
Federal Agency Reps.	EPA
Contractors:	**Ciba, URS Corporation**

The work party will consist of two people performing the sediment sampling tasks:

Work Party:	Robert Youhas, Ciba, (732) 914-2594 Todd Morrison, URS Corporation

General Safety Requirements

The following General Safety Procedures shall be followed by all persons entering and/or working on the site:

- There will be no activities conducted on-site without sufficient backup personnel. At a minimum, two persons must be present at the site.

- All contractor or subcontractor personnel shall bring to the attention of the Site Supervisor(s) any unsafe condition or practice associated with the site activities that they are unable to correct themselves.

- There will be no smoking, eating, chewing gum or tobacco, applying cosmetics, or drinking in the restricted area.

- Hands shall be thoroughly cleaned prior to smoking, eating or other activities outside the restricted area.

- Team members must avoid unnecessary contamination (i.e., walking through known or suspected "hot" zones or contaminated puddles, kneeling or sitting on the ground, leaning against potentially contaminated barrels or equipment).

- Respiratory devices may not be worn with beards, long sideburns, or under other conditions that prevent a proper seal.

Personal Protective Equipment

Based on an evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work areas or tasks.

Location	Job Function	Level of Protection				
In-River	Core Sampling	A	B	C	**D***	Other

- indicates that Level D is required for this job function

Level D personnel protection will include:

- Chemical-resistant gloves
- Boots/shoes, leather or chemical-resistant, steel toe and shank.
- Safety glasses or chemical splash goggles (optional unless required for specific job function).
- Hard hat

Decontamination Procedures

All non-expendable equipment will be cleaned according to Standard Operating Protocols. This protocol includes:

- Rinse with tap water;
- Wash with Alconox detergent (or soap) and water; and
- Rinse with distilled or tap water

The decontamination procedure for Level D and Level D (modified) requires the disposal of gloves, tyvek (if used), and boot covers (if used) in polyethylene-lined containers on-site. All non-disposal equipment used on-site that becomes contaminated will be cleaned by the protocol referenced above.

Emergency Medical Care

The following are qualified on-site First Aid Responders and/or EMTs: None

First Aid equipment is available on-site at the following locations:

First Aid Kit: Located in field vehicle

Emergency Eye Wash: Located in field vehicles

Emergency Shower: Water located in field vehicle

Water Supply: Approximately 5 gallons of water located in field vehicle
(no on-site water supply)

Telephones: Portable telephones on both members of the work party

Emergency Procedures

The following standard emergency procedures will be used by on-site personnel. These procedure may be modified as appropriate and required for each incident. The Site Safety Officer will be notified of any on-site emergencies and will be responsible for ensuring that the appropriate procedures are followed.

- **Gas Leak:** Isolate and evacuate the area immediately. Notify the gas company, fire and police departments listed on the front page of this HASP as soon as possible. If the gas leak occurs in the vicinity of the public, verbal warnings of the gas leak will be provided while evacuating the area.
- **Fire/Explosion:** The fire department will be notified and all personnel moved to a safe distance from the involved area.

- **Personal Protective Equipment Failure:** If any site worker experiences a failure or malfunction of personal protective equipment that adversely affects the protection factor, that person and his/her buddy will immediately leave the area. Re-entry will not be permitted until the equipment has been repaired or replaced.

Signature Page

I have read, understood, and agree to comply with the provisions set forth in this Site-specific Health and Safety Plan and as reviewed in the Health and Safety Briefing by the Site Safety Officer.

Prepared By:

Project Manager	Signature	Date

Approved By:

Project Manager	Signature	Date
Contractor	Signature	Date

APPENDIX C

CHEMICAL DATA SHEETS

CHLOROBENZENES

Synonyms:

Dichlorobenzenes: *o*-, *m*-, *p*- • Monochlorobenzene • Trichlorobenzenes

Description:

Colorless liquids and crystals

Occupational Exposure:

Chemical intermediate • Disinfectant • Dyestuffs • Fumigant • Heat transfer agent • Insecticide • Pharmaceuticals • Solvent

Threshold Limit Value:

o-dichloro — 50 ppm • 300 mg/m^3
p-dichloro — 75 ppm • 450 mg/m^3
monochloro — 75 ppm • 350 mg/m^3
1,2,4-trichloro — 5 ppm • 40 mg/m^3

Toxicity:

ROUTE OF ENTRY:

Inhalation • Percutaneous

MODE OF ACTION:

Irritant • Central nervous system depressant • Liver and kidney damage are possible

SIGNS AND SYMPTOMS:

Conjunctivitis and rhinitis • Headache • Skin burns from prolonged contact

DIAGNOSTIC TESTS:

None established

TREATMENT:

Irrigate eyes with water
Wash contaminated areas of body with soap and water
Gastric lavage, if ingested, followed by saline catharsis
Symptomatic and supportive

DISABILITY:

No permanent effects reported

Preventive Measures:

Adequate ventilation • Chemical goggles • Approved respiratory protection • Rubber gloves and protective clothing

Physical examination of exposed personnel on a regular basis including studies of liver and kidney function

Preclude from exposure those individuals with liver and kidney disease

REFERENCE:

HANDBOOK OF INDUSTRIAL TOXICOLOGY, THIRD EDITION;
E. R. PLUNKETT, M. D. (1987)

CYANIDES–CYANOGENS

Synonyms:

Cyanates—Ammonium cyanate • Potassium cyanate • Sodium cyanate • Others

Cyanide salts—Hydrogen cyanide • Potassium cyanide • Sodium cyanide • Others

Cyanogens—Cyanogen bromide • Cyanogen chloride

Nitriles (organic cyanides)—Acetonitrile • Ethyl cyanide • Glycolonitrile • Trichloro-*s*-triazine • Others

Description:

Gases, liquids, and crystals

Occupational Exposure:

Chemical synthesis • Electroplating • Etching • Fumigant • Gold extraction • Insecticide • Laboratory reagent • Metal treatment • Process engraving • Rocket propellant • Rodenticide • Solvent • Welding

Threshold Limit Value:

Hydrogen cyanide — 10 ppm • 10 mg/m^3
Cyanogen — 10 ppm • 20 mg/m^3
Cyanides — OSHA (PEL—skin) — 5 mg/m^3
Acetonitrile — 40 ppm • 70 mg/m^3

Toxicity:

ROUTE OF ENTRY:

Ingestion • Inhalation • Percutaneous

MODE OF ACTION:

Irritant and sensitizer
Inhibition of cytochrome oxidase and other enzyme systems
Secondary lactic acidosis

SIGNS AND SYMPTOMS:

Acute: Headache, weakness, and mental confusion • Nausea and vomiting with tachypnea and chest tightness • Shock, convulsions and coma

Subacute intoxication has been reported from low level exposures of several months duration and can resemble acute exposures but also exhibits fatigue and sleep disturbances

Chronic: Irritation of eyes and nose • Dermatitis and skin ulcers • Headache and tremors

DIAGNOSTIC TESTS:

Cyanide blood levels above 0.2 µg/ml are significant but unreliable for monitoring

The degree of lactic acidosis in acute cases appears to be a good diagnostic prognosticator

TREATMENT:

Preparation for therapy must be anticipated and appropriate procedures established

See Appendix A

DISABILITY:

Central nervous system damage occurs from prolonged hypoxia

REFERENCE:

HANDBOOK OF INDUSTRIAL TOXICOLOGY, THIRD EDITION;
E. R. PLUNKETT, M. D. (1987)

CYANIDES–CYANOGENS *(cont'd.)*

Preventive Measures:

Adequate ventilation • Chemical goggles • Approved respiratory protection • Rubber protective clothing

No food or smoking in work area

Ear plugs for employees with perforated ear drums

Employees should not work alone and should be instructed in emergency procedures

Preclude from exposure those individuals with diseases of central nervous system, heart, lungs, and kidneys

Blanc, P. et.al. 1985. Cyanide intoxication among silver-reclaiming workers. *JAMA* 253(3):367.

Dequidt, J. et. al. 1974. Acetonitrile poisoning. Report of a fatal case. *Europ. J. Toxicol.* 7:91.

Graham, D.L. et.al. 1977. Acute cyanide poisoning complicated by lactic acidosis and pulmonary edema. *Arch. Intern. Med.* 137:1051.

REFERENCE:

HANDBOOK OF INDUSTRIAL TOXICOLOGY, THIRD EDITION;
E. R. PLUNKETT, M. D. (1987)

LEAD, INORGANIC

Synonyms:

Plumbum

Description:

Metal is blue-gray
Salts are variable colored crystals and masses

Occupational Exposure:

Alloys • Batteries • Corrosion-resistant surfaces • Fingerprint detection powders • Glass making • Manufacture of tetraethyl lead • Metallurgy • Pigment • Plastics • Solder • X-ray shields

Threshold Limit Value:

Fume and dust — 0.15 mg/m³
Compounds — 50 µg/m³ OSHA
Specific OSHA regulations apply

Toxicity:

ROUTE OF ENTRY:

Ingestion • Inhalation

MODE OF ACTION:

Interferes with heme synthesis at two levels by interrupting delta-amino levulinic acid dehydratase (ALA-D) and ferrochelatase
Interferes with neurotransmitters
Causes nephropathy
Direct irritative action on gastrointestinal muscle
Gonadotoxic

SIGNS AND SYMPTOMS:

Acute stress such as injury, severe illness, dietary indiscretions, and emotional stress may precipitate symptoms of lead intoxication in persons whose metabolism of lead is in delicate balance
Lead intoxication tends to be a chronic disease covering a broad spectrum of adverse effects
General: Pallor • Weakness • Weight loss • Lassitude
Gastrointestinal: Metallic taste • Burton's lead line if oral hygiene is poor • Anorexia • Nausea • Vomiting • Constipation • Abdominal colic may occur
Genitourinary: Chronic nephritis and nephrosclerosis have been reported
Central nervous system: Impaired psychomotor performance • Irritability • Impaired concentration • Sleep disturbances • Depressed deep tendon reflexes • Peripheral neuropathy • Encephalopathy is now almost entirely confined to children
Musculoskeletal: Muscular aches and pains along with arthralgia do occur • Lead may be associated with gout nephropathy—"saturnine gout"
Hematopoietic: Normocytic, normochromic anemia with erythrocyte stippling and short red cell life
Reproductive: Hypospermia and oligospermia, increased incidence of abortions, miscarriages, and stillbirths

REFERENCE:

HANDBOOK OF INDUSTRIAL TOXICOLOGY, THIRD EDITION;
E. R. PLUNKETT, M. D. (1987)

LEAD, INORGANIC *(cont'd.)*

DIAGNOSTIC TESTS:

- Blood lead (normal < 35 µg/g creatinine)
- Urine lead (normal < 50 µg/g creatinine)
- Urine delta-amino levulinic acid and coproporphyrin are also useful

TREATMENT:

- Remove patient from exposure
- Therapy may not need to be dramatic
- Chelation when indicated is done with CaEDTA using 50 mg/kg intravenously each day in divided doses up to 5 days—the course may be repeated after several days rest; renal status must be checked before and during therapy
- Prophylactic chelation is contraindicated
- Symptomatic and supportive

DISABILITY:

- Encelphalopathy, paralyses, and nephropathy can result in permanent impairment

Preventive Measures:

- Adequate ventilation with regular monitoring of work environment • Approved respiratory protection • Protective clothing where indicated
- No eating or smoking in work area • Good personal hygiene
- Physical examination of exposed personnel at regular intervals with special attention to target organ systems and including blood lead determinations
- Preclude from exposure those with elevated lead levels, those with diseases of the central nervous system, kidneys, and blood
- Special review should be made of those who are in the reproductive age group

REFERENCE:

HANDBOOK OF INDUSTRIAL TOXICOLOGY, THIRD EDITION;
E. R. PLUNKETT, M. D. (1987)

POLYCHLORINATED BIPHENYLS

Synonyms:
Chlorodiphenyls (multiple isomers) • PCBs

Description:
Clear to yellow liquids with aromatic odor

Occupational Exposure:
Electrical transformers and capacitors • Heat transfer systems • Hydraulics • Lubricating and cutting oils • Plasticizers

Threshold Limit Value:
1 mg/m^3

Toxicity:

ROUTE OF ENTRY:
Inhalation • Percutaneous

MODE OF ACTION:
Irritant, generally toxicity increases with the degree of chlorination
All of these compounds may contain varying amounts of chlorinated dibenzofurans and polychlorinated naphthalenes

SIGNS AND SYMPTOMS:
Occupational:
Chloracne—comedones, sebaceous cysts and pustules on malar surface of face, ear lobes, and adjacent scalp
Erythema, swelling, dryness, and thickening of skin often associated with hyperpigmentation of skin and nails
Eyelid swelling and excessive eye discharge
Anorexia, nausea, and abdominal pain have also been reported
Hepatomegaly

Ingestion (Japanese yusho—rice oil disease):
Enlargement and hypersecretion of the Meibomian glands and swelling of eyelids
Pigmentation of nails and mucous membranes
Fatigue, nausea, and vomiting
Hyperkeratosis and darkening of the skin, most frequently on neck and upper torso
Chloracne
Chronic bronchitis
Sensory neuropathy with numbness of arms and legs

DIAGNOSTIC TESTS:
Blood levels of PCBs
Altered liver enzymes

TREATMENT:
Irrigate eyes with water
Wash contaminated areas of body with soap and water
Chloracne may require antibiotic or surgical intervention
Symptomatic and supportive

DISABILITY:
Impairment has not been severe but clinical evaluations continue

Preventive Measures:
Adequate ventilation • Closed systems where possible • Chemical goggles • Approved respiratory protection
Coveralls, gloves, and shoes
Good personal hygiene
Physical examination of exposed personnel at regular intervals with special attention to the skin, liver, and reproductive history and including pulmonary function tests and plasma PCB levels
Preclude from exposure fertile women and employees with skin and liver diseases

REFERENCE:

HANDBOOK OF INDUSTRIAL TOXICOLOGY, THIRD EDITION;
E. R. PLUNKETT, M. D. (1987)

TOLUENE

Synonyms:
Methyl benzene • Phenyl methane • Toluol

Description:
Colorless liquid, aromatic odor

Occupational Exposure:
Adhesives • Chemical synthesis • Detergents • Dyes • Explosives • Fuel • Paints and lacquers • Pharmaceuticals • Printing • Solvent

Threshold Limit Value:
100 ppm • 375 mg/m^3

Toxicity:

ROUTE OF ENTRY:
Inhalation • Percutaneous

MODE OF ACTION:
Irritant • Central nervous system depressant
Kidney and liver damage can occur

SIGNS AND SYMPTOMS:
Conjunctivitis • Keratitis
Defatting dermatitis • Skin paresthesias
Respiratory tract irritation with chemical pneumonitis
Headache, dizzinesss, drowsiness, mental confusion, incoordination, and ataxia followed by narcosis
Anorexia • Nausea • Vomiting
Liver and kidney damage in massive exposures with hepatomegaly, albuminuria, hematuria, and oliguria

DIAGNOSTIC TESTS:
Toluene in expired air and blood
Hippuric acid in urine (normal < 1.5 g/g creatinine)

TREATMENT:
Irrigate eyes with water
Wash contaminated areas of body with soap and water
Symptomatic and supportive

DISABILITY:
Permanent central nervous system changes have been reported

Preventive Measures:
Ascertain benzene content of all toluene used
Adequate ventilation • Chemical goggles • Approved respiratory protection • Rubber gloves
Physical examination of exposed personnel on a regular basis with special attention to the eyes and nervous system and including a blood count and studies of liver and kidney function
Preclude from exposure those with diseases of the central nervous system, liver, and kidneys

REFERENCE:

HANDBOOK OF INDUSTRIAL TOXICOLOGY, THIRD EDITION;
E. R. PLUNKETT, M. D. (1987)

XYLENE

Synonyms:

Dimethyl benzene • Three isomers: *o*-, *m*-, *p*-xylene

Description:

Clear liquid, aromatic odor
Commercial preparations may contain benzene

Occupational Exposure:

Adhesives • Cements • Chemical synthesis • Cleaning fluids • Degreasing • Dyes • Fuel additive • Inks • Insect repellants • Paints and lacquers • Perfumes • Pharmaceuticals • Resins • Solvent

Threshold Limit Value:

100 ppm • 435 mg/m^3

Toxicity:

ROUTE OF ENTRY:

Inhalation • Percutaneous

MODE OF ACTION:

Irritant
Central nervous system depression
Renal and hepatic damage

SIGNS AND SYMPTOMS:

Conjunctivitis • Keratitis
Irritation of nose and throat
Defatting dermatitis
Headache • Vertigo • Mental confusion • Drowsiness • Ataxia • Narcosis
Anorexia • Nausea • Vomiting • Gastric discomfort
Renal and hepatic damage have been reported

DIAGNOSTIC TESTS:

Xylene in expired air and blood
Methyl hippuric acid in urine

TREATMENT:

Irrigate eyes with water
Wash contaminated areas of body with soap and water
Symptomatic and supportive

DISABILITY:

No permanent effects reported

Preventive Measures:

Adequate ventilation • Chemical goggles • Approved respiratory protection • Rubber gloves
Physical examination of exposed personnel on a regular basis with special attention to the eyes and central nervous system and including a blood count and studies of liver and kidney function
Preclude from exposure those with diseases of the central nervous system, liver, kidneys, and blood

REFERENCE:

HANDBOOK OF INDUSTRIAL TOXICOLOGY, THIRD EDITION;
E. R. PLUNKETT, M. D. (1987)

ZINC OXIDE

Synonyms:
Chinese white • Flowers of zinc • Zinc white

Description:
White powder

Occupational Exposure:
Ceramics and glass • Cosmetics • Electrostatic copy paper • Feed additive • Ink pigment • Laboratory reagent • Matches • Paints • Pharmaceuticals • Photography • Pigment • Rubber manufacture • Welding

Threshold Limit Value:
5 mg/m^3

Toxicity:

ROUTE OF ENTRY:
Inhalation

MODE OF ACTION:
Irritant

SIGNS AND SYMPTOMS:
Dermatitis of exposed body surfaces with itching and red papulopustular lesions
Metal fume fever from inhalation of fumes
After an incubation period of 4–6 hours
Metallic taste, chest tightness, cough, and dyspnea
Headache, chills, fever, sweating, and myalgia follow
Nausea, vomiting, and weakness are not uncommon
Symptoms usually subside in 24–36 hours

DIAGNOSTIC TESTS:
Leucocytosis during first 12 hours
LDH elevation

TREATMENT:
Wash contaminated areas of body with soap and water
Symptomatic and supportive

DISABILITY:
No permanent effects reported

Preventive Measures:
Adequate ventilation • Approved respiratory protection

REFERENCE:

HANDBOOK OF INDUSTRIAL TOXICOLOGY, THIRD EDITION;
E. R. PLUNKETT, M. D. (1987)

APPENDIX D

BOATING SAFETY GUIDLINES

BOATING SAFETY GUIDELINES

Registration

All boats must be registered and their numbers and validation stickers displayed. The certificate of registration must be on board at all times when the boat is being operated.

Equipment

All boats used on projects will be required to have the equipment provided below.

Class A (Less than 16 feet long)

Type I, II, III or IV (Personal Flotation Device (PFD) per person.

Class B-1 fire extinguisher (if required by boat design).

Whistle/Air Horn/Flare Gun

Bilge ventilation and engine flame arrester on inboard engines.
Lights: 1 white 32-pt stern light which must be higher than any part of the boat; 1 red and green 10-pt side light forward (20 pt combined).

Equipment for Safety

- Life-Saving Devices

  All boats will carry flotation devices for all persons on board. It is an absolute "rule of the boat" that all crewmembers wear a life preserver or buoyant vest at all times when the craft is underway. At the higher speeds of most outboards, there may not be time to locate and put on a life jacket when a sudden emergency occurs.

- Paddle or Oar

  Required in some state and local jurisdictions, and by the Coast Guard Auxiliary for their courtesy examination decal, a paddle or pair of oars should be on all outboard boats. They could be the only way of reaching safety in the event of a motor failure. Most outboard craft row or paddle quite clumsily and with considerable effort, but it can be done, and the means to do so should be on board. Therefore, all boats will be required to carry a paddle or oars.

- Anchor and Line

  Every outboard should be equipped with a suitable anchor and line adequate in length for anchoring in all areas in which the boat is used.

- Bailer

  Every outboard should be equipped with a manual bailer. This can be a scoop purchased or homemade from a household plastic jug. A large sponge is frequently convenient for getting that last little bit of water out of a small boat.

Safety in Loading

Overloading is probably the greatest cause of accidents in small boats. Boats under 20 feet in length manufactured after October 31, 1972 must carry a capacity plate specified by Coast Guard regulations. Plates on outboard craft show boat fuel, gear and persons. Capacities from plates or self-determination are based on good weather conditions and should be reduced in rough waters.

It must always be remembered that people represent a "live" load; they move about and affect a boat quite differently than a "dead" or static load, such as the engine or fuel tank. If the capacity of the boat is fully utilized or the weather is rough, distribute the load evenly, keep it low, and don't make abrupt changes in its distribution. Any shifting of passengers or other weights should be done only after stopping or slowing the boat so that the change can be made safely.

Never jump into a boat or step on the gunwale (edge of the hull). If you have a motor or other gear to take aboard, pile it on the pier so that you can easily reach it from the center of the boat.

Handling

Before getting underway, have all weight evenly distributed so that the boat will trim properly-level from side to side and slightly down at the stern, never down at the bow. Passengers should be seated toward the centerline of the craft and not hanging over the sides; do not load too many passengers forward or aft. If the load is concentrated near the bow or stern, the boat will plow or drag needlessly, reducing your safety margin and increasing your fuel consumption. Proper trim is essential for proper performance.

Trim your boat as well as possible before getting underway. In smaller craft, it is dangerous for passengers to attempt to change places or move about while the boat is moving briskly. If such movement becomes essential, slow or stop the boat first, remembering in rough weather to keep enough momentum to retain steerage control and to keep the craft headed into wind and waves. Have the person who must move keep low and near the boat's centerline.

Outboard craft are often operated at relatively high speeds and their stability becomes a matter of safety. Some hulls will run straight ahead quite steadily, but have a tendency to heel excessively, or even "flip over", when turned sharply.

The faster a boat goes, the less keel it requires, and the more important it is to reduce speed to a safe value before starting a turn. Never turn more sharply than necessary. Normal operation seldom requires a sudden, sharp, high-speed turn.

Most outboard motors have a reverse gear than enables the boat to be operated backwards. (Very small motors usually do not have such gears, but can be pivoted around 180° to give thrust in the opposite direction.) Unless restrained, an outboard motor has the tendency to tilt itself up and out of the water when the thrust is reversed. On many models, there is a manually operated reverse lock that must be latched into place to keep the motor down while engaged in backing maneuvers. For normal running, however, it is important that this latch be released so that the lower unit will be free to tilt up if it strikes an underwater obstruction.

Courteous Operation

Keep your boat's speed under control at all times. Respect the rights and comforts of others afloat. Slow down not only when your craft is in danger, but also when it is a matter of courtesy to others. When passing other craft going in the same or opposite direction, give them a wide berth if possible, or drop down to a slow speed. When passing through or by an anchorage, throttle down to your slowest speed and keep an alert lookout for mooring, swimmers, debris, etc.

It is courteous to keep your wake low to avoid damage to other's boats. It is a wise action, too, for you are legally responsible for any damage to other boats or persons from the waves you leave behind you. **Reasonable Speeds Will Be Maintained by All Crews!**

Accidents

Various studies have shown the following to be the major causes of boating accidents:

1. Overloading, overpowering, and improper trim.
2. High speed turns, especially in rough water.
3. Failure to observe and react to obstructions.
4. Bad weather boating (prior to or after setting out).
5. Standing in a moving boat.
6. Having too much weight too high in the boat, as when someone sits on the deck of a small outboard.
7. Leaks in the fuel system.
8. Boating too far offshore.

Each of these factors, and others not listed here, should be avoided. A carefully matched boat, motor, and propeller, operated in accordance with the law and with courtesy, will go a long way toward eliminating accidents and even distressing moments. But some possibility of trouble always remains; be prepared to act in an emergency.

Capsizes

Stay with the boat if it capsizes. Almost invariably, the temptation is to try to swim to shore if land is in sight, and almost always the shore is farther than it appears. Most outboard boats will remain afloat, even if filled with water; more and more boats are being designed so that they will not only float, but will do so in an upright position. A boat is a much larger and more easily seen object than a person in the water; stay with the boat.

Rescuing a Person in the Water

One of the leading causes of death in boating accidents is drowning. Many of these fatalities result from people falling overboard. As the operator of the craft, it is your responsibility to know how to rescue such a person. You should practice maneuvers necessary to accomplish this; a ring buoy or buoyant cushion can be used as the simulated victim. Practice enough so that you will be able to react instinctively and correctly; minutes saved may mean a life saved.

As soon as someone falls overboard, maneuver the boat's stern away from him. Shift into neutral immediately (kill the motor if you do not have a gearshift) and throw a buoyant cushion or lifejacket near the victim – try to get close, but don't try to hit him with it. Make sure you are well clear of the person in the water before shifting into gear again.

Circle around quickly, selecting a course that will allow you to approach the person with the boat headed into the wind or waves. Approach him slowly, taking care to come alongside and not over him. Stop the motor before attempting to get the victim aboard.

When alongside, extend a paddle or boathook or toss one end of a line. With the motor stopped, lead the person around to the stern, where the freeboard is lowest, if there is enough space at the transom for the person to get aboard without hurting them on the motor. If this is not feasible, help the victim aboard over the side as far aft as possible. In either case, the use of a boarding ladder will help. To avoid capsizing while the person is coming aboard, other passengers should shift their weight to the opposite side to maintain trim as much as possible. When helping a person aboard, hold them under the armpits and lift gently.

Weather Rules for Safe Boating

Before setting out, obtain the latest available weather forecast for the boating area. Where they can be received, the NOAA Weather Radio continuous broadcasts (VHF-

FM) are the best way to keep informed of expected weather and water conditions. While afloat, keep a weather eye out for the approach of dark threatening clouds, which might indicate a squall or thunderstorm. Check radio weather broadcasts for latest forecasts and warnings. Heavy static on your AM radio may be an indication of nearby thunderstorm or electrical (lighting) activity.

If a thunderstorm catches you while afloat, remember that not only gusty winds, but, also, lightening poses a threat to safety. If caught in a thunderstorm, remember the following:

1. Stay low.
2. Keep away from metal objects that are not grounded to the boat's protection system.
3. Don't touch more than one grounded object at the same time (or you may become a shortcut for electrical surges passing through the protection system).
4. IMMEDIATELY, attempt to get yourself and the boat out of the water.